

REMARKS

In the above-identified Office Action, the Examiner has objected to the specification as not providing proper antecedent basis for the claimed subject matter and claims 4 and 5.

Applicant has amended the specification so that it now provides proper antecedent basis for these claims, and as such this objection is considered obviated.

Claims 1-5 have been rejected as being indefinite. The Examiner has questioned the meaning of the phrase "giant single crystal grains". Applicant has amended the claims so that they now refer to a "single crystal grain", thereby eliminating the use of the plural term and emphasizing that it is a single grain which is being claimed. Thus, this rejection is considered obviated.

Claims 1-5 have been rejected as being anticipated by the patent to Summerfelt. The Examiner stated that Summerfelt teaches a method comprising depositing a metallic film on a substrate and subsequently annealing the substrate and film to cause grain growth. Applicant disputes the Examiner's interpretation of Summerfelt noting that Summerfelt does not deposit a metallic film corresponding to that of Applicant's on a substrate, but rather there are intermediate layers between the substrate and the metallic film in question. Accordingly, Applicant has amended claim 1 so that it now recites that the metallic film is directly on a substrate and further has amended the claim so that it now recites that the invention consists essentially of the steps of depositing the film and then annealing the film. Summerfelt as stated above, teaches deposition of multiple layers, both beneath and above the metallic film in question. Accordingly, Summerfelt cannot anticipate nor make obvious a method of manufacturing a metallic film

To control the formation, microstructure or preferred orientation of a component upon deposition of a metallic film on a substrate, an additive gas is used, in addition to an inert gas such as Ar. As such, the subject invention uses O₂, N₂, or Cl as an additive gas during the deposition of the metallic film so as to change the energy states of the surface, interface and inside of the metallic film, to induce grain growth during post-annealing after deposition, and also to obtain a metallic film with a giant single crystal grain.

Applicant limits the additive gas to O₂, N₂ or Cl so that the above-mentioned energy states of the metallic film are changed and the additive gases are of an atomic size and thus can be included in the lattice of the metallic film. For instance, the radius of the Octahedral site of the Face-Centered Cubic array of Pt is 0.57Å, while O₂ is 0.48Å atomic radius and N₂ is 0.56Å atomic radius and thus these two can be used as an additive gas. Cl is also used as an additive gas because it can be included in a lattice of a metallic film without forming stable metallic compounds with the metallic film, depending on the kind of deposition metal.

Applicant has added new claims 7, 8 and 9 which reflect the subject inventions' further differences with Summerfelt. Summerfelt tries to obtain a grain size corresponding to a certain size of diameter of the metallic film. Here Applicant obtains a grain size that has a ratio of thickness to an average grain size of the metallic film of more than 50 (claims 6 and 7) or more than 1000 (claim 8) without depending on the substrate or the deposition method by depositing a metallic film such as Pt in an atmosphere of inert gas or additive gas such as O₂, N₂ or Cl so as to form a drag force in the metallic film to restrict the grain growth of the film, and post-annealing

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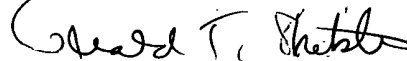
the film so as to induce abnormal grain growth of the film due to diffusion of the gas.

Summerfelt teaches that the size of the unit cell has to be in the sub-micron range in order to protect oxidation of the diffusion barrier of a semiconductor device. The metallic film of Summerfelt is deposited on the diffusion barrier layer in such a way that grains of the metallic film corresponding to the diameters of grains of the barrier layer are deposited by controlling nucleation and grain growth of the metallic film. Thus, Applicant's invention as now claimed is substantially different from that of Summerfelt and thus, patentable.

Applicant hereby requests reconsideration and re-examination thereof.

With the above amendments and the remarks, this application is considered ready for allowance, and Applicants earnestly solicit an early notice of same. If the Examiner believes that a telephone conference would expedite prosecution of the subject application, he is respectfully requested to call the undersigned attorney at the telephone number listed below.

Respectfully submitted,



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